

the release coat layers comprising a polymeric material which was vaporized under vacuum to form a smooth continuous solvent soluble and dissolvable barrier layer and support surface on which each of the layers of flake material is formed; and

removing the multi-layer vapor deposit from the vacuum deposition chamber and separating it into nanoscale flake particles by treatment with a solvent which dissolves the release coat layers and yields flakes with smooth, flat surfaces which are essentially free of the release coat material.

20. (New) The process according to claim 19 in which the flake layer comprises a vapor-deposited material selected from the group consisting of metal in elemental form, an inorganic material, and a non-metal.

A²³ 21. (New) The process according to claim 20 in which the non-metal comprises silicon monoxide, silicon dioxide or a polymeric material, in which the inorganic material is selected from the group consisting of magnesium fluoride, silicon monoxide, silicon dioxide, aluminum oxide, aluminum fluoride, indium tin oxide, titanium dioxide and zinc sulfide, and in which the metal is selected from the group consisting of aluminum, copper, silver, chromium, indium, nichrome, tin and zinc.

22. (New) The process according to claim 19 in which the release coat material is selected from styrene or acrylic polymers or blends thereof.

23. (New) The process according to claim 19 in which the flake layers are deposited to a flake (discrete island) thickness of less than about 100 nanometers.

24. (New) The process according to claim 19 in which the release coat layer comprises a thermoplastic polymeric material.

25. (New) The process according to claim 19 in which the release coat layer comprises a lightly cross-linked resinous material which is dissolvable in an organic solvent to yield the flakes which are essentially free of the release material.

26. (New) The process according to claim 19 in which the release coat layers are dissolvable in an organic solvent.

27. (New) A process for making flakes comprising:
providing a vacuum deposition chamber containing a deposition surface;
providing a release coat source and a flake deposition source in the vacuum deposition chamber, each directed toward the deposition surface;

depositing on the deposition surface under vacuum in alternating layers a vaporized polymeric release coat layer from the release coat source and a vapor deposited layer of flake material from the flake deposition source to build up in sequence a multi-layer vapor deposit of flake material layers separated by and deposited on corresponding intervening release coat layers;

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the release coat layers comprising a polymeric material which was vaporized under vacuum to form a smooth continuous solvent soluble and dissolvable barrier layer and support surface on which each of the layers of flake material is formed;

in which the polymeric release coat material has been melted outside the vacuum chamber and delivered to the chamber where the release coat source comprises a heating device which vaporizes the release coat material and in which the vaporized release coat material is conveyed to the deposition surface and deposited thereon as said release coat layer;

in which the flake deposition source comprises a thermal source in the vacuum chamber for evaporating the flake material; and

removing the multi-layer vapor deposit from the vacuum deposition chamber and separating it into flakes by treatment with a solvent which dissolves the release coat layers and yields flakes with smooth, flat surfaces which are essentially free of the release coat material.

28. (New) The process according to claim 27 in which the release coat/flake layer combination is repeatedly deposited at least ten times to build up the vapor deposit.

29. (New) The process according to claim 27 in which the flake layer comprises a vapor-deposited material selected from the group consisting of metal in elemental form, an inorganic material, and a non-metal.

30. (New) The process according to claim 29 in which the non-metal comprises silicon monoxide, silicon dioxide or a polymeric material, and the inorganic material is selected from the group consisting of magnesium fluoride, silicon monoxide, silicon dioxide, aluminum oxide, aluminum fluoride, indium tin oxide, titanium dioxide and zinc sulfide, and on which the metal comprises aluminum, copper, silver, chromium, indium, nichrome, tin and zinc.

31. (New) The process according to claim 27 in which the release coat material is selected from styrene or acrylic polymers or blends thereof.

32. (New) The process according to claim 27 in which the flake layers are deposited to a film thickness of less than about 500 angstroms.

33. (New) The process according to claim 27 in which the polymeric release coat layer comprises a lightly cross-linked resinous material which is dissolvable in an organic solvent to yield the flakes which are essentially free of the release material.

34. (New) The process according to claim 27 in which the release coat layers are dissolvable in an organic solvent.

35. (New) The process according to claim 27 in which the release coat layer comprises a thermoplastic polymeric material.

36. (New) The process according to claim 27 in which the release coat material includes a lightly cross-linked polymeric material with weak bond strength or a polymeric material which has been polymerized by chain extension.

37. (New) The process according to claim 27 in which the optical density of the vapor deposited metal layer is in the range of about 0.5 to about 2.8 (MacBeth densitometer).

38. (New) The process according to claim 27 in which the release coat layer has a thickness in the range of about 200 to about 400 angstroms.

39. (New) The process according to claim 27 in which the metal flakes have an aspect ratio of 300 or more.

40. (New) The process according to claim 27 including creating a differential pressure area adjacent the heating device and the deposition surface to prevent the escape of vapor toward the thermal source.

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41. (New) A process for making flakes comprising:
providing a vacuum deposition chamber containing a deposition surface;
providing a release coat source and a flake deposition source in the vacuum deposition chamber, each directed toward the deposition surface;

depositing on the deposition surface under vacuum in alternating layers a vaporized polymeric release coat layer from the release coat source and a vapor deposited layer of flake material from the flake deposition source to build up in sequence a multi-layer vapor deposit of flake material layers separated by and deposited on corresponding intervening release coat layers;

the release coat layers comprising a polymeric material which was vaporized under vacuum to form a smooth continuous solvent soluble and dissolvable barrier layer and support surface on which each of the layers of flake material is formed;

in which the release coat source comprises a wire feed mechanism in which the polymeric release coat material is coated onto a wire fed to the vacuum chamber and evaporated under heat therein to be deposited as said release coat layer; and

removing the multi-layer vapor deposit from the vacuum chamber deposition and separating it into flakes by treatment with a solvent which dissolves the release coat layers

and yields flakes with smooth, flat surfaces which are essentially free of the release coat material.

42. (New) The process according to claim 41 in which the release coat material is selected from styrene or acrylic polymers or blends thereof.

43. (New) The process according to claim 41 in which the wire feed mechanism delivers the coated release coat material to a heater block positioned adjacent the deposition surface for evaporating the release coat material.

44. (New) A process for making flakes comprising:
providing a vacuum deposition chamber containing a deposition surface for receiving alternating layers of a release coat material and flake material;

providing a release coat source and a flake deposition source in the vacuum deposition chamber, each directed toward the deposition surface;

in which the release coat source comprises a heater block positioned adjacent the deposition surface and a carrier for delivering the release coat material to the heater block; and in which the flake deposition source comprises a thermal source for evaporating the flake material and directing it toward the deposition surface;

depositing on the deposition surface under vacuum in alternating layers a vaporized polymeric release coat layer from the heater block and a vapor deposited layer of flake material from the thermal source to build up in sequence a multi-layer vapor deposit of flake material layers separated by and deposited on corresponding intervening release coat layers;

the release coat layers comprising a polymeric material which was vaporized under vacuum to form a smooth continuous solvent soluble and dissolvable barrier layer and support surface on which each of the layers of flake material is formed; and

removing the multi-layer vapor deposit from the vacuum deposition chamber and separating it into flakes by treatment with a solvent which dissolves the release coat layers and yields flakes with smooth, flat surfaces which are essentially free of the release coat material.

45. (New) The process according to claim 44 in which the release coat material includes a lightly cross-linked polymeric material with weak bond strength or a polymeric material which has been polymerized by chain extension.

46. (New) The process according to claim 44 in which the flake layer comprises a vapor-deposited material selected from the group consisting of metal in elemental form, an inorganic material, and a non-metal.

47. (New) The process according to claim 46 in which the non-metal comprises silicon monoxide, silicon dioxide or a polymeric material, and the inorganic material is selected from the group consisting of magnesium fluoride, silicon monoxide, silicon dioxide, aluminum oxide, aluminum fluoride, indium tin oxide, titanium dioxide and zinc sulfide and in which the metal is selected from the group consisting of aluminum, copper, silver, chromium, indium, nichrome, tin and zinc.

48. (New) The process according to claim 44 in which the release coat material is selected from styrene or acrylic polymers or blends thereof.

49. (New) The process according to claim 44 in which the flake layers are deposited to a film thickness of less than about 400 angstroms.

50. (New) Apparatus for making flakes comprising:
a vacuum deposition chamber containing a deposition surface for receiving alternating layers of a release coat material and a flake material;

a release coat source and a flake deposition source in the vacuum deposition chamber, each directed toward the deposition surface;

in which the release coat source comprises a heater block adjacent the deposition surface for evaporating the release coat material and a carrier for delivering the release coat material to the heater block; the flake deposition source comprising a thermal source for evaporating the flake material;